

# Equitable and Environmentally-Sound Car Parking Policy at Schools

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## Introduction

This paper describes a parking policy that distributes the benefit of parking to all students of driving age, regardless of how often they choose to drive. It does this by

- charging a fair price for the parking, per unit of time parked,  
and by
- giving the earnings to all students of driving age, in proportion to the time they spend at the school.

This same method is applied to the school's employees.

Reference 1 describes a more comprehensive policy that will efficiently and conveniently unbundle the cost of parking in all circumstances. It is available at the following URL: <http://www.sandiego.gov/environmental-services/pdf/sustainable/parkingcosts.pdf>.

The system described herein is less complex because it does not include congestion pricing, price predictions, or policies that are unique to on-street parking. These features can be eliminated, because it is assumed that there will be an adequate supply of parking, so no congestion pricing is needed; that the price can be relatively stable, so no price predictions are needed; and finally, that students and employees can be successfully required to park only at the school, so there is no need for new, on-street parking policies, designed to protect adjoining neighborhoods from the intrusion of additional parked cars.

## Rationale

This system of "unbundled parking cost" will allow all stakeholders to see the actual value of the parking. It will reduce driving to the school. Less driving will reduce traffic congestion, air pollution and greenhouse gas (GHG) emissions.

Parking is expensive to provide. Therefore, if no parking had been provided, the saved money could have been invested to increase employee salaries. The method described in this paper allows employees to gain some of that lost salary back, by driving less.

Providing free or underpriced parking only benefits employees that would drive every day, even if they had a method to recover some of their lost salary.

## **Methods**

The parking is operated on the behalf of the students and employees, as if it were their own business. Those that drive are therefore their own customers.

*Charge* for parking is proportional to time parked and is charged to the student or employee associated with the car. (A charge rate that is acceptable to all must be established.) For example, if sixty cents per hour is selected, the charging software could round off the parking duration time to the nearest minute and apply a one-cent-per-minute charge. The data-collection method could be implemented with RFID's on cars being detected at parking-lot entrances and exits. (Unauthorized cars coming onto the campus would be identified with license-plate detection and, if a car belonging to a felon is driven onto the campus, a warning notice could be sent to authorities, if this is desired by the school board.)

*Earnings* (net revenue, minus the cost of collection and distribution) are given to students of driving age and to employees, in proportion to the time they spend at the school (except for the days they were "dropped off", meaning chauffeured; this feature is described in the next paragraph). This could be based on a student's or employee's schedule or, for more accuracy, could be based on "time-at-the-school" data, collected using personal radio frequency identification units (RFIDs) and detectors that are tied to a central, implementing computer. The variables used to compute the amount of money to be paid to a student are shown in Table 1. The corresponding formula is shown in Figure 1. The same approach would be used to compute the earnings of the employees.

**Table 1      Variables Used to Compute a Student's Monthly Earnings**

<b>Definitions to Compute A Student's Monthly Earnings</b>		
<b>T<sub>Student</sub></b>	The Student's Monthly Time at the School	
<b>T<sub>AllStudents</sub></b>	Total Monthly Time at School, All Students	
<b>E<sub>AllStudents</sub></b>	Total Monthly Earnings from the Student Parking	

**Figure 1      Formula Used to Compute a Student's Monthly Earnings**

$$E_{\text{Student}} = T_{\text{Student}} * ( E_{\text{AllStudents}} / T_{\text{AllStudents}} )$$

*“Drop off” (chauffeured) policy* is as follows. Students may only be dropped off in designated areas. Cars used for this purpose must be authorized and associated with either a student or an employee. For the day that a car is used for drop off or pickup, the student or employee associated with the car accumulates no time at the school, used for the purpose of computing earnings.

*Parking statements* are automatically sent out monthly, showing the individual’s charges and earnings. For students, the net earnings, for those that drive less than the average, could be distributed in the form of a check, or could be deposited to a school-board-created 401K or other type of savings account. This savings account money could then be used for college tuition or awarded to the student when they turn 21 years of age, if that is desired by the school board. Studies have shown that students that have a savings account for college are more likely to attend college.

### **Implementation**

Since this is a new system, it would be prudent for the school board to have the vendor take the full responsibility for operating the system, for the first 10 years. This arrangement would ensure that the vendor would debug the system and continue to look for operational efficiencies, over the 10 year period. A sliding scale of vendor-compensation could be specified in the contract, as follows: The vendor could operate the system for 10% of the revenue, for the first 5 years; 5% of the revenue, for the next 3 years; and 2% of the revenue, for the final 2 years. For example, if it is assumed that, on average, 600 cars are parked for 8 hours, for 200 days per year, at a rate of 50 cents per hour, then the yearly revenue would be \$480,000 per year. The vendor would therefore collect \$240,000 over the first 5 years, \$72,000 over the next 3 years, and \$28,800 over the last two years. Figure 2 shows contact information and excerpts of received emails, from a San Diego vendor. This particular vendor has stated that both the design and the installation of a fully-automated system would be easy to perform.

### **Experience of Other Schools/Organizations**

Table 2 shows nine public schools and two private schools that charge for parking. (It should be noted that the method described here is much more than just “charging for parking”, because the earnings are given back to the students and employees.) Table 3 shows that introducing a price differential into the choice of how often to drive will decrease the amount of driving.

### **Other Benefits**

Depending on the school’s location and the size of its access roads, there could be a substantial decrease in local congestion, improving the health of all students. This

parking policy will show neighbors that the administration is working to be a good citizen. This program will encourage active transportation, meaning modes that provide exercise for the students. It will also teach the students the value of parking. It is recommended that the method of determining the selected rate of charge be shared with both the students and the community at large. This program can be thought of as a demonstration project of a new approach to parking.

**Figure 2 One Set of Identified-Vendor Information**

<p><b>David R. Carta, Ph.D., CEO</b>  <b>TELAERIS Inc.</b>  <b>Innovative Solutions and Rapid Development</b>  <b>9123 Chesapeake Dr., San Diego, CA 92123</b>  <b>+1.858.627.9708 : Office</b>  <b>+1.858.627.9702 : Fax</b>  <b>+1.858.449.3454 : Mobile</b>  <b>e-mail: <a href="mailto:David.Carta@Telaeris.com">David.Carta@Telaeris.com</a></b>  <b>skype: davidcarta</b></p>	<p>I reviewed your Intelligent Parking proposal and presentation in their entirety. The identification of vehicles which you suggest for student parking using commercially available RFID technologies is a fairly straightforward process. There are numerous, inexpensive passive (no battery required) RFID tags which have been specifically designed for use on cars and trucks. These tags are installed directly on license plates or windshields, can be read from up to 30 meters away, and can be read as cars drive up to 60 mph. Additionally, automatic license recognition systems, used in conjunction with RFID, can provide a high level of enforcement making it difficult to cheat the system, similar to the Fast Track system which allows tolls to be automatically collected.</p>
	<p>This is not too tough - we probably would integrate with a service that already sends physical mail from a electronic submission instead of re-inventing this wheel.</p>

### **Green House Gas Impacts**

S-3-05 is a California Governor's Executive Order to drop Year 2020 levels of greenhouse gas (GHG) emissions to the level of 1990 emissions and to drop our Year 2050 level of GHG emissions to 80% *below* 1990 levels. If the world achieves similar reductions, the earth's level of atmospheric CO<sub>2</sub> will be capped at 450 parts per million (PPM). Figures 3, 4, and 5 show how large 450 PPM is, compared to values over the last 800 thousand years. Reference 3 shows that the goal of S-3-05 is to limit atmospheric CO<sub>2</sub> to 450 PPM and it also shows that even if this cap is achieved, the risk of a human catastrophe caused by global warming is significant. Reference 4's Figure 1 shows that a significant reduction in driving is critically needed.

### **Conclusion**

Adopting this program will benefit the school in numerous ways. Students will gain an understanding of economics and technology. All members of the school community can

take pride in being part of this pioneering effort to reduce driving and the associated green house gases. It is a demonstration of the fundamental features of Reference 1. It will set an example for other schools and employers.

**Table 2 American High Schools that Charge for Parking**

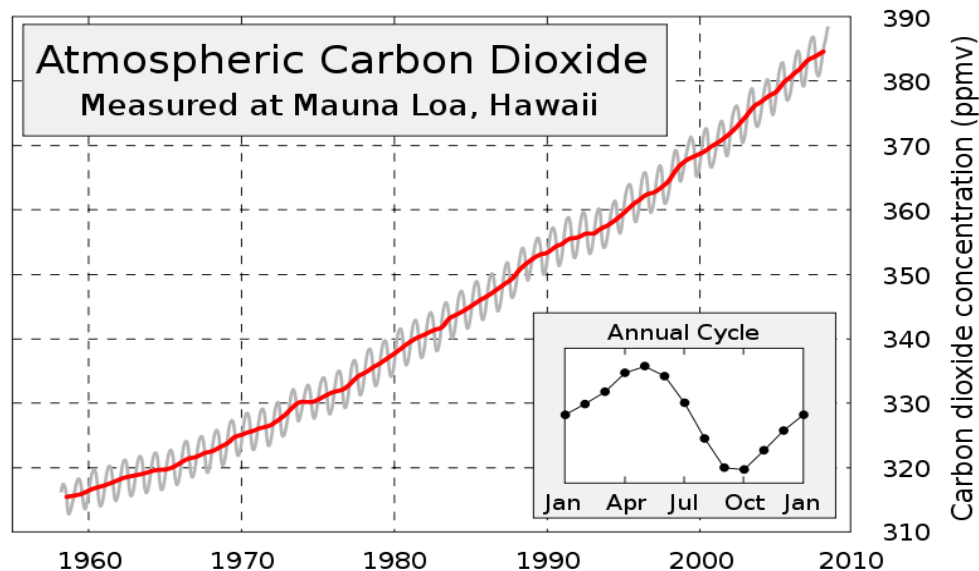
<b>Eleven U.S. High Schools that Charge Students to Park</b>						
<b>State</b>	<b>City</b>	<b>County</b>	<b>High School</b>	<b>Price Per year</b>	<b>Link to Price</b>	<b>Link to Location</b>
California	Anaheim	Orange	Servite <sup>1</sup>	\$25	<a href="http://www.servitehs.org/apps/pages/index.jsp?uREC_ID=86492&amp;type=d">http://www.servitehs.org/apps/pages/index.jsp?uREC_ID=86492&amp;type=d</a>	<a href="http://en.wikipedia.org/wiki/Anaheim,_California">http://en.wikipedia.org/wiki/Anaheim, California</a>
Illinois	Maple Park	DeKalb	Kaneland	\$150	<a href="http://www.kaneland.org/khs/">http://www.kaneland.org/khs/</a>	<a href="http://en.wikipedia.org/wiki/Maple_Park,_Illinois">http://en.wikipedia.org/wiki/Maple Park, Illinois</a>
Minnesota	Andover	Anoka	Andover	\$100	<a href="http://www.anoka.k12.mn.us/education/components/docmgr/default.php?sectiondetailid=276465&amp;fileitem=96679&amp;catfilter=24892">http://www.anoka.k12.mn.us/education/components/docmgr/default.php?sectiondetailid=276465&amp;fileitem=96679&amp;catfilter=24892</a>	<a href="http://en.wikipedia.org/wiki/Andover,_Minnesota">http://en.wikipedia.org/wiki/Andover, Minnesota</a>
Wisconsin	German Town	Washington	German Town	\$150	<a href="http://www.germantownnow.com/news/92202694.html">http://www.germantownnow.com/news/92202694.html</a>	<a href="http://en.wikipedia.org/wiki/Germantown,_Wisconsin">http://en.wikipedia.org/wiki/Germantown, Wisconsin</a>
Virginia	Herndon	Fairfax	Herndon	\$200	<a href="http://www.fcps.edu/HerndonHS/stud_life/park_reg.htm">http://www.fcps.edu/HerndonHS/stud_life/park_reg.htm</a>	<a href="http://www.fairfaxcounty.gov/">http://www.fairfaxcounty.gov/</a>
North Carolina	Holly Springs	Wake	Holly Springs	\$153	<a href="http://hollyspringshs.wcpss.net/Parking/HSHS%20PARKING%20REGULATIONS%202010-2011.pdf">http://hollyspringshs.wcpss.net/Parking/HSHS%20PARKING%20REGULATIONS%202010-2011.pdf</a>	<a href="http://en.wikipedia.org/wiki/Holly_Springs,_North_Carolina">http://en.wikipedia.org/wiki/Holly Springs, North Carolina</a>
New Jersey	Newton	Sussex	Kittatinny Regional	\$50	<a href="http://www.krhs.net/new08/ActivityFees.pdf">http://www.krhs.net/new08/ActivityFees.pdf</a>	<a href="http://en.wikipedia.org/wiki/Newton,_New_Jersey">http://en.wikipedia.org/wiki/Newton, New Jersey</a>
Massachusetts	Ipswich	Essex	Ipswich <sup>1</sup>	\$50	<a href="http://www.wickedlocal.com/ipswich/news/x1146471597/Student-parking-fee-set-override-nixed#axzz1Qy0d7dfi">http://www.wickedlocal.com/ipswich/news/x1146471597/Student-parking-fee-set-override-nixed#axzz1Qy0d7dfi</a>	<a href="http://en.wikipedia.org/wiki/Ipswich,_Massachusetts">http://en.wikipedia.org/wiki/Ipswich, Massachusetts</a>
Massachusetts	Andover	Essex	Andover	\$200	<a href="http://www.aps1.net/DocumentView.aspx?DID=1409">http://www.aps1.net/DocumentView.aspx?DID=1409</a>	<a href="http://en.wikipedia.org/wiki/Andover,_Massachusetts">http://en.wikipedia.org/wiki/Andover, Massachusetts</a>
Massachusetts	Palmer	Hampden	Palmer	\$100	<a href="http://www.masslive.com/news/index.ssf/2009/09/school_committee_defends_100_p.html">http://www.masslive.com/news/index.ssf/2009/09/school_committee_defends_100_p.html</a>	<a href="http://en.wikipedia.org/wiki/Palmer,_Massachusetts">http://en.wikipedia.org/wiki/Palmer, Massachusetts</a>
Connecticut	Stonington	New London	Stonington	\$100	<a href="http://www.thewesterlysun.com/mysticriverpress/news/school-board-plans-parking-fees-reassignment/article_d72199e4-9d9f-11e0-8406-001cc4c03286.html">http://www.thewesterlysun.com/mysticriverpress/news/school-board-plans-parking-fees-reassignment/article_d72199e4-9d9f-11e0-8406-001cc4c03286.html</a>	<a href="http://en.wikipedia.org/wiki/Stonington,_Connecticut">http://en.wikipedia.org/wiki/Stonington, Connecticut</a>
<sup>1</sup> These schools are private. The other nine schools are public.						

Table 3

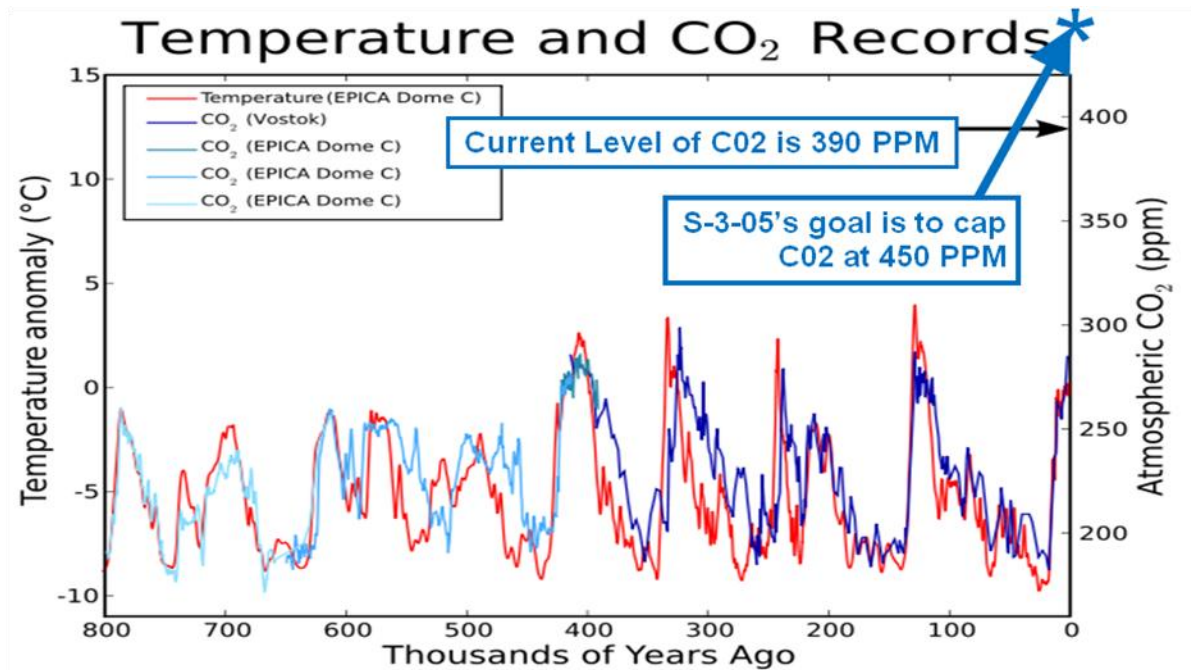
## Eleven Cases of Pricing Impact on the Amount of Driving

Impact of Financial Incentives on Parking Demand			
Location	Scope	1995 dollars per mo.	Parking Use Decrease <sup>1</sup>
<b>Group A: Areas with little or no public transportation</b>			
CenturyCityDistrict, West Los Angeles	3500 employees at 100+ firms	\$81	15%
Cornell University, Ithaca, NY	9000 faculty & staff	\$34	26%
San Fernando Valley, Los Angeles	1 employer, 850 employees	\$37	30%
Costa Mesa, CA		\$37	22%
<b>Average for Group</b>		<b>\$47</b>	<b>23%</b>
<b>Group B: Areas with fair public transportation</b>			
Los Angeles Civic Center	10000+ employees, several firms	\$125	36%
Mid-Wilshire Blvd., Los Angeles	1 mid-size firm	\$89	38%
Washington DC Suburbs	5500 employees at 3 worksites	\$68	26%
Downtown Los Angeles	5000 employees, 118 firms	\$126	25%
<b>Average for Group</b>		<b>\$102</b>	<b>31%</b>
<b>Group C: Areas with good public transportation</b>			
University of Washington, Seattle Wa.	50,000 faculty, staff & students	\$18	24%
Downtown Ottawa, Canada	3500+ government staff	\$72	18%
Belleve, WA	1 firm with 430 employees	\$54	39% <sup>2</sup>
<b>Average for Group, but not Bellevue Washington</b>		<b>\$45</b>	<b>21%</b>
<b>Over All Average, Excluding Bellevue Washington</b>			<b>25%</b>
<sup>1</sup> Parking vacancy would be higher! <sup>2</sup> Not used, since transit & walk/bike facilities also improved.			

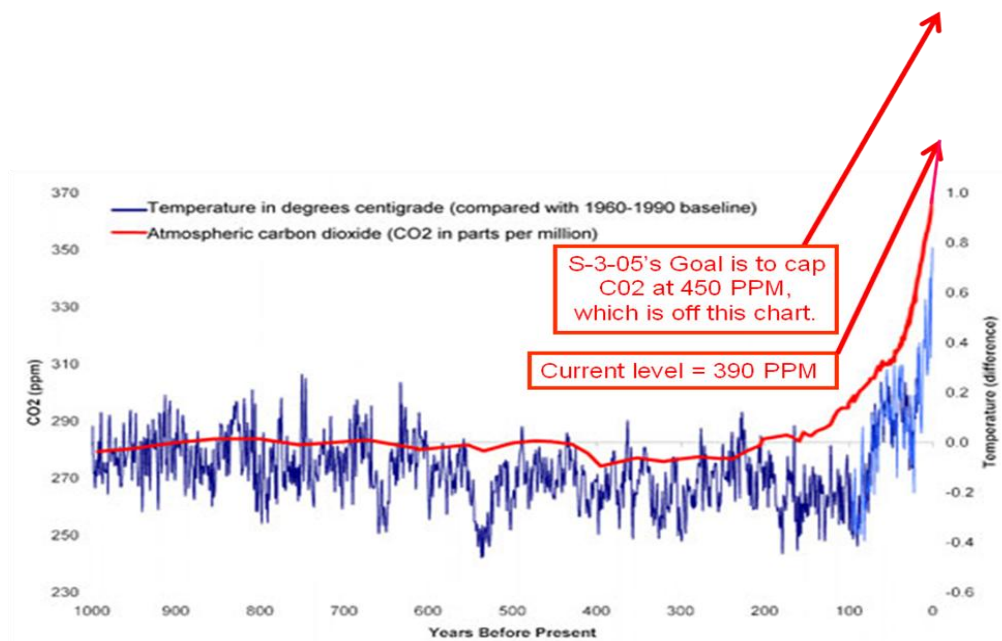
Figure 3

Atmospheric CO<sub>2</sub>, Increasing Over Recent Decades

**Figure 4** Atmospheric CO<sub>2</sub> and Mean Temperature, 800,000 Years Ago, with 450 PPM CO<sub>2</sub> Shown



**Figure 5** Atmospheric CO<sub>2</sub> and Mean Temperature, Over the Last 1,000 Years





## **References**

- 1.) *A Plan to Efficiently and Conveniently Unbundle Car Parking Costs*, Paper 2010-A-554-AWMA of the proceedings of the 103<sup>rd</sup> Conference and Exhibition of the Air And Waste Management Association; Mike R. Bullock and Jim R. Stewart, PhD; presented on June 22<sup>nd</sup>, 2010. Also available at [http://www.moderntransit.org/parking/Modern\\_Transit\\_Society.html](http://www.moderntransit.org/parking/Modern_Transit_Society.html)
- 2.) *CarlsbadHS2010\_2.pdf*, a “pdf” file of a Power Point file created in 2010, Mike Bullock. Available upon request from Mike Bullock, [mike\\_bullock@earthlink.net](mailto:mike_bullock@earthlink.net)
- 3.) Letter from *Center for Biological Diversity*, to Elaine Chang, Deputy Executive Officer of Planning, Rule Development, and Area Sources of the South Coast Air Quality Management District; *Comments on Survey of CEQA Documents on Greenhouse Gas Emissions Draft Work Plan and Development of GHG Threshold of Significance for Residential and Commercial Projects*; April 15, 2009. Available upon request from Mike Bullock, [mike\\_bullock@earthlink.net](mailto:mike_bullock@earthlink.net)
- 4.) *Communities Tackle Global Warming*, Tom Adams (California League of Conservation Voters), Amanda Eaken, and Ann Notthoff (Eaken and Notthoff are employees of the Natural Resources Defense Council); June 2009. Available at <http://www.nrdc.org/globalwarming/sb375/files/sb375.pdf>